CHAPTER 1

NEED FOR COOLING WATER SYSTEMS AND PURPOSE OF THIS ENVIRONMENTAL IMPACT STATEMENT

The implementation of cooling water systems for major sources of thermal effluents at the Savannah River Plant (SRP) is needed for compliance with the Clean Water Act and a Consent Order (84-4-W), dated January 3, 1984, and amended August 27, 1985, and August 31, 1987, between the U.S. Department of Energy (DOE) and the South Carolina Department of Health and Environmental Control (SCDHEC). The purpose of this environmental impact statement is to address the potential environmental consequences of constructing and operating alternative cooling water systems for thermal discharges from K- and C-Reactors and from a coal-fired powerhouse in D-Area as input to the selection and implementation of such systems. | TC

1.1 NEED

The Savannah River Plant is a controlled-access area of approximately 780 square kilometers (192,700 acres) near Aiken, South Carolina. It is a major DOE installation established in the early 1950s for the production of nuclear materials for national defense. Plant facilities, which can be characterized as heavy industry, consist of five production reactors (four operational and one in standby status), electrical and steam generating plants, two chemical separations facilities, fuel and target fabrication facilities, research laboratories, and support and administrative facilities.

The major sources of thermal effluents at the Savannah River Plant are the cooling water discharges from the production reactors and an onsite coal-fired powerhouse. Two of the currently operating production reactors, K- and C-Reactors, discharge their cooling water directly to Pen Branch and Four Mile Creek, respectively. The coal-fired powerhouse in D-Area normally discharges cooling water from cooling-system condensers into an excavated canal that flows into Beaver Dam Creek.

The thermal effluent from P-Reactor is cooled by an onsite 2700-acre cooling lake, Par Pond. DOE conducted Section 316(a) and 316(b) studies, as required by the Federal Water Pollution Control Act, as amended (33 USC 1326), and submitted the results of these studies to SCDHEC. On May 14, 1987, SCDHEC concurred with DOE's conclusions that balanced indigenous populations of fish, shellfish, and wildlife presently exist in Par Pond and that the present operations of P-Reactor pose no threat to the continued existence of a balanced indigenous biological community. L-Reactor discharges its cooling water to a 1000-acre cooling lake. Predictive Section 316(a) studies indicating the probable existence of balanced biological communities within and below the cooling lake have been submitted to, and approved by, SCDHEC. The restart of L-Reactor and the cooling lake are discussed extensively in the Environmental Impact Statement, L-Reactor Operation, Savannah River Plant (DOE, 1984a). More detailed discussions of P- and L-Reactors are not within the scope of this EIS. | AJ-1

A renewed NPDES permit (Number SC0000175) issued by SCDHEC became effective on January 1, 1984, for SRP operations. The purpose of this permit was to regulate the Plant's discharges of wastewater - including cooling water - to surface streams and other water bodies. As stated in the permit, cooling water discharge temperature limits for K- and C-Reactors and the D-Area powerhouse are not to exceed an instream temperature after mixing of 32.2°C; in addition, the effluent must not raise the temperature of the stream more than 2.8°C above its ambient temperature unless the maintenance of a balanced biological community can be determined by a Section 316(a) demonstration study.

To achieve compliance with these temperature limitations, DOE and SCDHEC entered into a mutually agreed-on Consent Order (84-4-W). This order temporarily superseded the temperature requirements in the NPDES permit and established a process for attaining compliance. Key elements of this process required DOE to:

- Complete a "Comprehensive Cooling-Water Study" of the thermal effects of operations at the Savannah River Plant
- Complete and submit a Thermal Mitigation Study to SCDHEC
- Submit and actively support funding requests to accomplish any actions resulting from the Thermal Mitigation Study
- Undertake work on the alternatives approved by SCDHEC, under a schedule to be established in an amendment to the Consent Order, subject to the appropriation of funds by Congress

In compliance with the Consent Order, DOE submitted a Thermal Mitigation Study (DOE, 1984b) to SCDHEC on October 3, 1984; the Comprehensive Cooling-Water Study, Annual Report (Du Pont, 1985) was submitted in July 1985.

On August 27, 1985, DOE and SCDHEC mutually agreed on an amendment to Consent Order 84-4-W of January 3, 1984, that established a compliance schedule for the completion of National Environmental Policy Act (NEPA) documentation by December 31, 1986. This amendment also established an implementation schedule for the start of construction of a selected cooling water system for C-Reactor on or before September 30, 1987, and completion of construction on or before March 31, 1989. The amendment established the date for the start of construction of a system for K-Reactor on or before September 30, 1987, and completion of construction on or before July 31, 1989. The Consent Order also established March 31, 1987, as the date by which DOE must submit a plan of study and an approvable schedule for the implementation of a cooling water system for the D-Area powerhouse. In compliance with the Amended Consent Order, DOE published a Notice of Availability (51 FR 10652) and submitted a copy of the draft environmental impact statement (EIS) to SCDHEC on March 28, 1986.

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On October 29, 1986, DOE and SCDHEC mutually agreed that it would be necessary to change the schedule in the Amended Consent Order. DOE requested this change to respond to comments received from SCDHEC and the U.S. Environmental Protection Agency on the draft EIS. On August 31, 1987, DOE and SCDHEC

mutually agreed on a second amendment to the Consent Order, which established a compliance schedule for the completion of NEPA documentation by October 31, 1987. The second amendment also specified that on or before September 30, 1988, DOE must submit plans and specifications to SCDHEC for the K-Reactor mitigation alternative subject to the authorization of and appropriation of funds by Congress. In addition, this amendment established an implementation schedule for the start of construction of a selected cooling water system for K-Reactor on or before February 28, 1990, and completion of construction on or before December 31, 1992. The amended Consent Order also established March 31, 1988, as the date by which DOE must submit a plan for a Section 316(a) demonstration study and an approvable schedule for the implementation of a cooling water system for the D-Area powerhouse. In addition, the amended Consent Order stated that DOE shall notify SCDHEC immediately upon determination that C-Reactor is to restart and propose a timely schedule for construction of its thermal mitigation alternative. TC

Implementation of cooling water system alternatives at K- and C-Reactors and the D-Area coal-fired powerhouse is needed for compliance with South Carolina water classification standards [as contained in the NPDES permit (Number SC0000175)], and Consent Order 84-4-W between DOE and SCDHEC.

1.2 PURPOSE

The purpose of this environmental impact statement is to address the potential environmental consequences of constructing and operating cooling water systems for thermal discharges from K- and C-Reactors and from the coal-fired powerhouse in D-Area in compliance with Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended, and to provide input into the selection and implementation of such systems.

The proposed action is to construct and operate cooling water systems for K- and C-Reactors and the D-Area powerhouse to attain compliance with the State of South Carolina's Class B water classification standards. DOE's preferred alternatives are to construct and operate once-through cooling towers for the K- and C-Reactors, and to implement increased flow with mixing for the D-Area powerhouse.

This EIS considers three cooling water alternatives each for K- and C-Reactors and three alternatives for the D-Area powerhouse. The alternatives for K- and C-Reactors are the construction and operation of once-through cooling towers; the construction and operation of recirculating cooling towers; and the continuation of direct discharge - or no action [as required by the Council on Environmental Quality for Implementing the National Environmental Policy Act (40 CFR 1502.14)]. The three alternatives for the D-Area powerhouse are to increase the inlet water flow to the D-Area raw-water basin; to implement direct discharge to the Savannah River; and to continue the present operation - or no action.

This EIS describes the cooling water alternatives (Chapter 2) and the affected Savannah River Plant environment (Chapter 3), and assesses the potential environmental consequences of construction and operation of alternative cooling water systems, including cumulative and unavoidable and irreversible

impacts (Chapter 4). Chapter 5 discusses Federal and State of South Carolina regulatory requirements/permits and studies and monitoring programs that are applicable to the construction and operation of the cooling water systems.

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Eight documents published in the last 3 years are relevant to an understanding of the potential environmental effects of the construction and operation of alternative cooling water systems:

- Environmental Impact Statement, L-Reactor Operation, Savannah River Plant, Aiken, South Carolina (DOE, 1984a) describes alternative cooling water systems for L-Reactor and the potential environmental effects of these systems on the Savannah River and the onsite swamp system.

- Thermal Mitigation Study - Compliance with the Federal and South Carolina Water Quality Standards, Savannah River Plant, Aiken, South Carolina (DOE, 1984b) discusses and evaluates 22 possible cooling water alternatives for K- and C-Reactors and the D-Area powerhouse.

- The Comprehensive Cooling-Water Study Annual Report and Final Report, Savannah River Plant, Aiken, South Carolina (Du Pont, 1985; 1987) evaluates the environmental effects of the intake and release of cooling water on the structures and functions of aquatic ecosystems at the Savannah River Plant, including water quality, radionuclide and heavy metal transport, wetlands ecology, aquatic ecology, and endangered species.

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- Draft Environmental Impact Statement, Alternative Cooling Water Systems, Savannah River Plant, Aiken, South Carolina (DOE, 1986) describes alternative cooling water systems for K- and C-Reactors and the D-Area powerhouse and the potential environmental effects of these systems on the Savannah River and the onsite streams.

- Impingement and Entrainment at the River Water Intakes of the Savannah River Plant (DOE, 1987) summarizes the impact of withdrawing Savannah River water for secondary cooling of SRP nuclear reactors and a large, coal-fired, stream generation facility on the Savannah River fisheries.

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- Chlorination/Dechlorination Studies Relating to Proposed Cooling Towers for K- and C-Reactors (Wilde, 1986) provides information on the chlorination and dechlorination of SRP reactor cooling water pumped from the Savannah River.

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- Habitat Evaluation Procedure (HEP) Assessment for Thermal Mitigation Alternatives for C- and K-Reactors (Mackey et al., 1987) identifies the value of habitat to be gained or lost with the implementation of once-through or recirculating cooling towers.

REFERENCES

DOE (U.S. Department of Energy), 1984a. Final Environmental Impact Statement, L-Reactor Operation, Savannah River Plant, Aiken, South Carolina, DOE/EIS-0108, Savannah River Operations Office, Aiken, South Carolina.

DOE (U.S. Department of Energy), 1984b. Thermal Mitigation Study, Compliance with Federal and South Carolina Water Quality Standards, Savannah River Plant, Aiken, South Carolina, DOE/SR-5003, Savannah River Operations Office, Aiken, South Carolina.

DOE (U.S. Department of Energy), 1986. Draft Environmental Impact Statement, Alternative Cooling Water Systems, Savannah River Plant, Aiken, South Carolina, Savannah River Operations Office, Aiken, South Carolina. | TC

DOE (U.S. Department of Energy), 1987. Impingement and Entrainment at the River Water Intakes of the Savannah River Plant, submitted to the U.S. Army Corps of Engineers as Special Condition B of Section 404 Permit #84-2Z-088 for the L-Lake Embankment, Savannah River Operations Office, Aiken, South Carolina. | BD-5

Du Pont (E. I. du Pont de Nemours and Company, Inc.), 1985. Comprehensive Cooling-Water Study, Annual Report, DP-1697, Volumes 1-11, J. B. Gladden, M. W. Lower, H. E. Mackey, W. L. Specht, and E. W. Wilde (editors), Savannah River Laboratory, Aiken, South Carolina.

Mackey, H. E., Jr., C. E. Davis, L. Price, and W. Fay, 1987. Habitat Evaluation Procedure (HEP) Assessment for Thermal Mitigation Alternatives for C- and K-Reactors, DPST-87-578, E. I. du Pont de Nemours and Company, Savannah River Laboratory, Aiken, South Carolina. | BC-2

Wilde, E. W., 1986. Chlorination/Dechlorination Studies Relating to Proposed Cooling Towers for K- and C-Reactors, DP-1730, E. I. du Pont de Nemours and Company, Savannah River Laboratory, Aiken, South Carolina. | BE-1 BC-16